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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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YOUNG & THOMPSON
209 Madison Street
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Alexandria, VA 22314

EXAMINER

SHUMATE, ANTHONY R

ART UNIT	PAPER NUMBER
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1775

NOTIFICATION DATE	DELIVERY MODE
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11/17/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketingDept@young-thompson.com

Office Action Summary	Application No. 10/592,938	Applicant(s) HAGG ET AL.	
	Examiner ANTHONY SHUMATE	Art Unit 1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>13 September 2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The Amendment filed 13 September 2010 has been entered and fully considered.
2. Claims 1 and 3-20 are pending, of which claims 6, 8, 12-14, and 16-18 were amended, and 19 and 20 are new. Claim 16 is withdrawn from consideration.
3. The previous drawing objection at sections 6-9 are withdrawn in light of Applicant's amendments to the drawings.
4. The previous specification objection referring to "AC" is withdrawn in light of Applicant's amendments to the specification.
5. The previous specification objection referring to "references 1-8" is withdrawn in light of Applicant's amendments to the specification.
6. The previous claim objections at sections 11-13 are withdrawn in light of Applicant's amendments to the claims.
7. The previous 35 USC 101 rejection at section 15 is withdrawn in light of Applicant's amendments to the claims.
8. The previous 35 USC 112 rejections at sections 17 and 19-30 are withdrawn in light of Applicant's amendments to the claims. But, the amendments have necessitated new grounds of rejection.

Information Disclosure Statement

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9. The information disclosure statement filed 13 September 2010 fails to comply with 37 CFR 1.98(a)(1), which requires the following: (1) a list of all patents, publications, applications, or other information submitted for consideration by the Office; (2) U.S. patents and U.S. patent application publications listed in a section separately from citations of other documents; (3) the application number of the application in which the information disclosure statement is being submitted on each page of the list; (4) a column that provides a blank space next to each document to be considered, for the examiner's initials; and (5) a heading that clearly indicates that the list is an information disclosure statement. The information disclosure statement has been placed in the application file, but the information referred to therein has not been considered.

10. The listing of references in the Applicant arguments/remarks is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Election/Restrictions

11. Newly submitted claim 16 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: claims 12-20 are drawn

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to a method of separating CO₂ from a gaseous mixture, when no method of separating CO₂ from a gaseous mixture was originally presented. The method is a different statutory class than the apparatus and therefore independent and/or distinct from the invention originally claimed.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 16 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Specification

12. The disclosure is objected to because of the following informalities:

The disclosure is also objected to because on 10-11, applicants list references 1-8 and this is improper and should be provided on an IDS if necessary.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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14. Claims 5, 6, 8, 9, 14, 18 and 20 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 5, the phrase "cut-off" is unclear as to with the claimed molecular weight parameter is "less than", "more than," or having some other relation with the recited value.

Regarding claim 6, the phrase "molecular weight cut-off" as used in the context of the claim renders the claim indefinite. The phrase is unclear as to whether it limits the value of the molecular weight to the 'maximum molecular weight,' 'minimum molecular weight' or some other relation with the recited value.

Claims 8, 14, 18 and 20 has the phrase, "above about" which is unclear, thereby rendering the claim indefinite. (See 2173.05(b) A)

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 1, 3, 4, 7-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over WANG et al. (CN-A-1363414) ("WANG") in view of Quinn et al. Membrane Science 1995, 104, 139-146 ("QUINN139"), Quinn et al. Membrane Science 1997, 131, 49-60 ("QUINN49"), Quinn et al. Membrane Science 1997, 131, 61-69 ("QUINN61") and the MERCK INDEX of "ammonium fluoride", as evidenced by the article entitled "Novel Fixed-Site-Carrier Polyvinylamine Membrane for Carbon Dioxide capture," and PINSCHMIDT, JR., et al. (US 4973410).

Applicant admits on the record at page 2 paragraph 2 of the instant specification, "CN-A-1363414 discloses the use of FSC membranes for the purpose of separating CO₂ from gases like N₂, O₂, CO and CH₄. This publication discloses a process for preparing a composite membrane to separate carbon dioxide gas from a gas mixture by hollow or flat sheet membranes of polysulfone, polyacrylonitrile, or polyether sulfone through dipping the membrane in polyvinylamine solution for 5-60 minutes, cross-linking with 5-50% glutaraldehyde solution for 5-40 minutes and in a solution of sulphuric acid or hydrochloric acid for 5-30 minutes, followed by drying and washing with water."

It is the Examiner's position that dipping the polysulfone membrane in polyvinylamine solution inherently coats the polysulfone membrane with polyvinylamine.

Also, Applicant admits on the record that at page 4327 column 2 last paragraph of "Novel Fixed-Site-Carrier Polyvinylamine Membrane for Carbon Dioxide capture," "The method used for crosslinking may also contribute in a positive way to the selective transport of CO₂. Quinn et al. ³²⁻³⁴ (Quinn et al., references in the rejection heading above) suggested the possible role of fluoride ions in facilitated transport in a swollen membrane, as illustrated in Figure 2."

QUINN et al. (41, 61 and 139) all teach in the entire disclosures the possible role of fluoride ions in facilitated transport in a swollen membrane.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to simply substitute the hydrogen sulfuric acid of WANG with hydrofluoric acid since Quinn et al. ³²⁻³⁴ (Quinn et al., references in the rejection heading above) suggested the possible role of fluoride ions in facilitated transport in a swollen membrane, alternatively since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (MPEP 2144.05 PART II-A)

[MERCK provides extrinsic evidence that ammonium fluoride forms an acid aqueous solution.]

Alternatively, it would have been obvious to one having ordinary skill in the art at the time the invention was made to simply substitute the hydrogen sulfuric acid of WANG with ammonium fluoride of MERCK, since Quinn et al. ³²⁻³⁴ (Quinn et al., references in the rejection heading above) suggested the possible role of

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fluoride ions in facilitated transport in a swollen membrane, alternatively since It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. (MPEP 2144.07).

QUINN49 teaches at page 55 column 2 paragraph 1 gas streams must contain some water vapor to maintain permselectivity. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide water vapor, since QUINN49 teaches at page 55 column 2 paragraph 1 gas streams must contain some water vapor to maintain permselectivity. It is the Examiner's position that the presence of water vapor intrinsically causes the membrane to swell absent evidence otherwise.

WANG does not explicitly teach the molecular weight of the polyvinylamine. But, WANG teaches at the abstract polyvinylamine. Also, it is the Examiner's position that polyvinylamine of WANG intrinsically has a molecular weight. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a polyvinylamine within the claimed molecular range(s), since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (MPEP 2144.05 PART II-A)

As evidence to support discovering the optimal or workable ranges for crosslinking, the following references are applied.

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Applicant admits on the record at page 4330 column 1 of "Novel Fixed-Site-Carrier Polyvinylamine Membrane for Carbon Dioxide capture," "The dried cast membranes were crosslinked by different procedures to find the optimum method:

1. Glutaraldehyde (50%, 30 min);
2. Glutaraldehyde (50%, 30 min), and then H_2SO_4 (pH=1, 10-30 min);
3. N_4F (0.5 M, 2 h);
4. Glutaraldehyde (50%, 30 min), and then NH_4F (0.5 M, 2 h);
5. H_2SO_4 (pH=1, 10-30 min) or HCl (pH=1, 10-30)."

Also, PINSCHMIDT, JR., et al. (US 4973410) provides extrinsic evidence at the title and examples 1-3 crosslinking vinylamine polymer (i.e. polyvinylamine) in a solution of HCl and Glutaraldehyde.

In view of this, the limitations of claims 1-4 and 7-18 are met.

17. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over WANG et al. (CN-A-1363414) ("WANG") in view of Quinn et al. Membrane Science 1995, 104, 139-146 ("QUINN139"), Quinn et al. Membrane Science 1997, 131, 49-60 ("QUINN49"), Quinn et al. Membrane Science 1997, 131, 61-69 ("QUINN61") and the MERCK INDEX of "ammonium fluoride", as evidenced by the article entitled "Novel Fixed-Site-Carrier Polyvinylamine Membrane for Carbon Dioxide capture," and PINSCHMIDT, JR., et al. (US 4973410) as applied to claims 1, 3, 4, 7-15 and 17-20

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above and further in view of Applicant admission on page 5 first paragraph of the instant specification.

Applicant admits on the record at page 5 first paragraph of the instant specification that Danish Separation Systems AS provides a flat sheet membrane of polysulfone with a molecular weight cut-off of 20,000.

WANG discloses the use of polysulfone but is silent as to the molecular weight of the material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the polysulfone defined by Danish Separation Systems AS as the polysulfone according to WANG, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. (MPEP 2144.07). It is to be noted that the two polysulfone materials are used for the same purpose.

In view of this, the limitations of claims 5-6 are met.

The following is an alternative rejection to the one defined above.

18. Claims 8, 9, 14, 15, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over WANG et al. (CN-A-1363414) ("WANG") in view of Quinn et al. Membrane Science 1995, 104, 139-146 ("QUINN139"), Quinn et al. Membrane Science 1997, 131, 49-60 ("QUINN49"), Quinn et al. Membrane Science 1997, 131, 61-69 ("QUINN61") and the MERCK INDEX of "ammonium fluoride", as evidenced by the

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article entitled "Novel Fixed-Site-Carrier Polyvinylamine Membrane for Carbon Dioxide capture," and PINSCHMIDT, JR., et al. (US 4973410) as applied to claims 1, 3, 4, 7-15 and 17-20 above, and further in view of applicants admission on page 4 of the specification.

Applicant admits on the record at page 4 lines 20-25 of the instant specification, "The Hofmann reaction was suggested as a quick and convenient method of preparing PV Am from PAA by TANAKA et al. (see references 5-7)" and admit that achieving the molecular weight needed is determined by reaction conditions which is within the scope of the skilled artisan.

WANG does not explicitly teach the molecular weight of the polyvinylamine. But, WANG teaches at the abstract polyvinylamine. Also, it is the Examiner's position that polyvinylamine must have a molecular weight.

As admitted by applicants, there is a relationship between reaction conditions and degree of polymerization of polyvinylamine. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a polyvinylamine within the claimed molecular range(s), since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (MPEP 2144.05 PART II-A)

In view of this, the limitations of claims 8, 9, 14, 15, and 18 are met.

Response to Arguments

19. Applicant's arguments filed 13 September 2010 have been fully considered but they are not persuasive.

20. Applicant argues at page 14, "Cut-off is part of the recitation of a molecular weight cut-off (MWCO = Molecular Weight Cut Off) which refers to the lowest molecular weight of the molecule in which 90% of the molecule is retained by the membrane.

Below this molecular weight, much less is being retained."

a. Respectively, the Examiner does not find the Applicant's argument persuasive. First, it is noted that the specification does not recite, "Cut-off is part of the recitation of a molecular weight cut-off (MWCO = Molecular Weight Cut Off) which refers to the lowest molecular weight of the molecule in which 90% of the molecule is retained by the membrane. Below this molecular weight, much less is being retained."

b. Secondly, this description provided by the Applicant does not cure the indefiniteness of the claim. The claim as written does not provide clear warning to others in the context of 'what constitutes infringement' that the, "Cut-off is part of the recitation of a molecular weight cut-off (MWCO = Molecular Weight Cut Off) which refers to the lowest molecular weight of the molecule in which 90% of the molecule is retained by the membrane. Below this molecular weight, much less is being retained."

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21. Applicant argues at page 14, that cut-off is a well-known term in the art, therefore itself is clear/definite.

a. Respectively, the Examiner does not find the Applicant's argument persuasive. The rejection was mainly directed towards that the phrase as used in the context of the claim rendered the claim indefinite.

22. Applicant argues at pages 16-19 that, "Surprisingly, the crosslinking with ammonium fluoride provides an increase of selectivity by a factor of 100, something which there was no reasonable expectation to see."

a. Respectively, the Examiner does not find the Applicant's argument persuasive. The instant independent claim 1 is not commensurate in scope with the alleged unexpected results. Instant independent claim 1 has a genus of fluoride; and the Applicant has not provided sufficient evidence that the entire genus of fluoride has unexpected results.

b. Furthermore, instant table 1 shows a polysulfone support with **ammonium fluoride** which has a selectivity of 26.9 which is not an increase of selectivity by a factor of 100. (bolding added for emphasis) It is noted that the instant independent claim 1 encompasses this polysulfone support with **ammonium fluoride** which has a selectivity of 26.9 which is not an increase of selectivity by a factor of 100. Therefore, the claim is not commensurate in scope with the alleged unexpected results.

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23. Applicant argues at pages 16-19 that, "Surprisingly, the crosslinking with ammonium fluoride provides an increase of selectivity by a factor of 100, something which there was no reasonable expectation to see. Thus considered alone there is nothing to motivate the person skilled in the art to try this specific crosslinking method amongst others."

a. Respectively, the Examiner does not find the Applicant's argument persuasive. The alleged unexpected results will not be considered alone. The alleged unexpected results will be considered with other available evidence.

24. Applicant argues at pages 19-20 that, "if the membranes according to Quinn were crosslinked it would seem as though the membranes might serve less well."

a. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

25. Applicant argues at page 20 that, "Nor does Pinschmidt comprise any evidence which would allow the skilled person to achieve or conceive of the result as shown in the present invention."

a. Respectively, the Examiner does not find the Applicant's argument persuasive. Presently, the Examiner rests on the rejection made.

Conclusion

26. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY SHUMATE whose telephone number is (571)270-5546. The examiner can normally be reached on M-Th 9-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Marcheschi can be reached on (571)272-1374. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. S./
Examiner, Art Unit 1775

/Jason M. Greene/
Primary Examiner, Art Unit 1775